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ABSTRACT

The explosive economic growth and rising prosperity of Taiwan is linked to the country's system of vocational education. Paralleling Taiwan's rapid economic transformation has been the growth of its national educational system. Both the government and the private sector have been making concerted efforts to develop education, resulting in constant increases in educational expenditures, and the percent of Gross National Product allocated to education far exceeds that of many other richer nations. The number of schools and colleges has exploded and total school enrollment has increased fivefold since 1950. The vocational education system has also increased dramatically. Currently, there are about 150,000 vocational school students, 100,000 technical college students, and 2,000 institute of technology students graduating each year in Taiwan. The total number of 252,000 graduates from the technical and vocational education system far exceeds the 60,000 academic high school graduates or 40,000 college graduates each year. There are seven types of vocational schools in Taiwan: agricultural, industrial, commercial, marine products, nursing and midwifery, opera and arts, and home economics. Emphasis presently is on the expansion of industrial and maritime education while slowing the development of commercial schools and enriching the curricula of agricultural schools and readjusting home economic education according to needs. Taiwan's emphasis on mass vocational education extends to postsecondary level education, as evidenced by the creation of closer linkages between high schools and postsecondary institutions. Technical colleges are continuing to grow in importance. In addition, the government supports technical training and skills upgrading both in school and on the job for workers. Vocational education and training has had a major influence in providing the skilled labor force that has transformed Taiwan into one of the world's most powerful economies. (Contains 13 references.) (KC)

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Vocational Education and Training Plays an Important Role in Taiwan's Economic Miracle

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Vocational Education and Training Plays an Important Role

in Taiwan's Economic Miracle

Four decades of breakneck growth have transformed Taiwan, Republic of China from an Asian backwater into one of the region's most powerful economies. Taiwan, one of Asian's "Four Tigers," is now one of the leading manufacturing centers of the world.

The standard of living in Taiwan is climbing at a dizzying pace. Although not yet as rich as some Western countries, Taiwan's buying power doubles every eight years on average. Recently, it has been growing even faster. The island's foreign's reserves topped $75 billion at one point in 1988. Only Germany and Japan had more. In 1992, the per capital GNP in Taiwan had reached US$10,000. This figure is often cited by analysts as a benchmark for attaining developed nation status. But whether Taiwan has indeed become a "developed nation" has been moot for some time if one considers how much healthier its economy is than that of most developed nations. Contrast Taiwan economic growth of 9 percent in 1988 and 7.8 percent in 1991 to the anemic or flat growth in the developed nations of the West due to global recession. Such economic success has propelled Taiwan into fourteen place among global trading nations and twelfth among world exporters. The details of this achievement are well known to business people worldwide.

Taiwan is a small island. Despite the island is poor in natural resources and must import the materials for most everything it produces, Taiwan was able to overcome the barriers and has achieved a high standard of living. One of the most important factor contributing to the economic success in Taiwan is its highly motivated and well-trained

labor work force. A recent study conducted by a German research institute rated the productivity among workers in Taiwan the world's second best, next only to that of workers in Singapore (Land, 1990). This excellent work force results from the outstanding vocational education and training in the island (Chen & Shih, 1989).

Programs and curricula in vocational education in Taiwan have traditionally been linked to the nation's priority of economic development. This paper focuses on the impacts of economic development on vocational education and training as well as the status of training for skilled work force in this newly developed country.

Economic Evolution in Taiwan

Taiwan, Republic of China is an island about 100 miles off the southeast coast of mainland China. Its total area is 14,000 square miles including Penghu and other offshore islands; it is a little larger than the Netherlands and a little smaller than Switzerland. Only a quarter of the total land area is arable, with the western coastal plain containing most of the arable land and population.

Taiwan is one of the most densely populated countries in the world, with a population of over 20 million or 1,482 persons per square mile. Yet the island is poor in natural resources and must import the materials for most everything it produces. Despite the limit of natural resources and the growing diplomatic isolation after the withdrawal from the United Nations in 1971, Taiwan has achieved great success both in rapid economic growth and in the distribution of resources over the last four decades. In 1963, Taiwan's economy was largely agriculture-based, with 55.6 percent of the total labor

force. In 1981, manufacturing and service sectors comprised 81.2 percent of the total labor force while agricultural accounted only 18.8 percent. By 1991, the proportion of jobs in manufacturing and service sectors increased to 87.1 percent (Bureau of Statistics, 1993; Land, 1990).

Economic Conditions

During the past four decades, the economy of Taiwan has experienced phenomenal growth. Table 1 reflects the economic growth over the last forty years. Since 1952, gross national product (GNP) has increased by about 157 times; per capita GNP by 76 times; exports by 710 times; and imports by 384 times. The average economic growth rate since 1952 has exceeded 8.3 percent annually, reaching a high of 11.9 percent in 1973. After bottoming out at 0.6 percent in 1974 when Taiwan's economy was struck by global inflation and a worldwide monetary crisis, the growth rate rebounded to 4.05 percent in 1982. It has exceeded that level ever since. The average economic growth rate was 7.24 percent in 1991, and 6.06 percent in 1992. This compares with less than 4.5 percent for Japan, negative 2.2 percent for United Kingdom, 4.5 percent for Netherlands, and negative 0.7 percent for the United States (Bureau of Statistics, 1993). Table 2 shows the comparisons of the economic conditions with other countries.

Other economic indicators underscore the same pattern of high-level development. The industrial production index was 67.9 in 1982 and steady increased to 131.24 in 1992. In 1992, Taiwan's GNP reached US$210 billion or US$10,215 GNP per capita. Moreover, with average annual rate of inflation of 1.9 percent, the people in Taiwan had

been enjoying price stability along with rapid growth and prosperity (Bureau of Statistics, 1993).

In 1990, Taiwan's foreign currency reserves exceeded US$70 billion. Foreign exchange controls were relaxed in 1987. Capital-intensive and technology-intensive industries are gradually growing. Wages rates are no longer low, compared with the neighboring developing countries. Most farmers' and workers' families have color television sets, air-conditioners, washing machines, refrigerators, telephones, video cassette recorders, motorcycles or cars. There is extensive home ownership as well.

Recent progress in Taiwan has not been confined to the economic sphere. Taiwan have undergone rapid democratization since the lifting of martial law in 1987, a process that has vitalized and invigorated the entire country. Although workers now enjoy the legal right to strike, labor-management relations, surprisingly, have not deteriorated. In manufacturing sector, real earnings rose by more than 9 percent each year between 1986 to 1989. Moreover, Taiwan no longer has a surplus of labor but is actually suffering from a labor shortage (Employment and Vocational Training Administration, 1990).

Economic Development

Taiwan's rapid economic development resulted in prosperity for a great number of people. In the past forty years, 5.5 million new jobs have been created. At the same time, Taiwan economic development has increased the average life expectancy from 58 to 74 years. Electrical lighting, once available in only 33 percent of local buildings, is now in 99.7 percent of all buildings. In the past 35 years, citizens who had at least a high

school education have increased from 28 percent of the population to 91 percent. College graduates have gone from 11 percent to 35 percent. These improvements are all the results of Taiwan's impressive economic development. It is obvious that economic development improves employment prospects, improves the living standards of citizens and makes society more peaceful and stable.

Taiwan economic development has also promoted the development of private industry. During the 1940s, the Taiwan government invested a great amount of money in public construction projects and this lead to the development of private industry. Since 1953, Taiwan has gone through nine Four-Year National Development Plans, and two Six-Year National Development Plans. Each plan began under different environmental and political conditions. The first Six-Year Plan began in 1974. At that time, the "Ten Major Construction Projects" and the promotion of private industry were the primary goals of the plan. In 1991, the Taiwan government has launched the second six-year national development plan with the budget of US$30 billion aiming to transform the island into a developed country. The priority of the second Six-Year Plan was upgrading Taiwan's infrastructure and preparing the nation for the 21st century. In addition, the plan hoped to breathe new life into the "ten industries" and "eight technical industries."

Structural Changes

Taiwan's economy is very dependent on foreign trade. Accordingly, most major industries are export-oriented or are suppliers for export industries. The appreciation of the New Taiwan dollar and increasing wage costs mean that labor-intensive industries--

including the lower end of the garment, textile, shoe, toy, and sundry goods industries--are facing fierce competition from neighboring lower-cost countries. Today, Taiwan is entering a period of rapid structural change as the island fights to stay ahead of emerging competitors such as China and southeast Asia, and narrow the gap with Japan and the West. Taiwan is investing heavily to move to upscale and high technology products and processes. Across-the-board retooling, upgrading, and computerization of Taiwan's industry is underway. Taiwan is focusing increasingly on higher-value quality products and on high-technology industries for domestic production, and moving labor-intensive industries to Southeast Asia and mainland China.

The development of high-technology industries continues to be a government priority and represents one of Taiwan's success stories. Major contributing factors to this success include the plentiful supply of capable technical workforce, the granting of a variety of tax and other investment incentives, the establishment in 1973 of a government-funded Industrial Technology Research Institute (ITRI), and the opening in 1980 of the Science-based Industrial park at Hsinchu. A new aerospace industrial zone was opened in Taichung in 1990 to develop parts and components production.

Educational Development

Paralleling Taiwan's rapid economic transformation has been the growth of its national educational system. Since the Chinese Nationalist Government was relocated to Taiwan in 1950, the economy has enjoyed a quick growth and the population has been on the rise. To meet growing demand warranted by the circumstances, both the

government and the private sector have been making concerted efforts to pursue development of education, leading to constant increase in educational expenditure from year to year. In 1953, the educational expenditure accounted for 1.54 percent of GNP. In Fiscal year 1991, the total educational expenditure reached US$12 billion. The Taiwan government invested 5.45 percent of its total annual expenditure on public schooling; and the total percentage of GNP allocated for public and private education combined amounted to 6.63 percent (Ministry of Education, 1992). As compared the data from other countries, that rate represents a very substantial commitment to schooling, far exceeding that of many other richer nations (Lucas, 1981; Verner, 1979).

A comparison in number of education institutions across the past forty years showed that there were 7 colleges and universities, 77 vocational schools, 128 middle schools, 1,231 elementary schools, and 28 kindergartens in 1950. Today, Taiwan take prides in its 123 colleges and universities, 212 senior vocational schools, 177 senior academic high schools, 706 junior high schools, 2,495 elementary schools, and 2,495 kindergartens. The total number of schools is 6,208, representing an increase of 3.2 fold over 40 years. The density was 188.5 schools per 1,000 square kilometers in the school year 1991-92. On the average, every town/township had 18.5 schools (Ministry of Education, 1992). Table 3 summaries the number of schools and student enrollment at all levels within the system in 1991-92.

Total student enrollment has increased fivefold, from 1.05 million in the school year 1950-51 to 5.32 million in the school year 1991-92. There were 139.64 school

students per 1,000 population in 1950-51, and the ratio had increased to 258.36 school students per 1,000 population in 1991-92. On the average, each teacher took care of 36.35 students in 1950-51, but the ratio declined to 24.22 students per teacher in 1991-92. The decline signaled that the number of teachers increased at a pace faster than the number of students did. In other words, the decline benefitted students by giving them more attention and better care (Ministry of Education, 1992).

In 1950, elementary schools, junior high schools and junior vocational schools accounted for 93.39% of total school students at all stages of education; senior academic high schools and senior vocational schools for 3.39%; junior colleges and institutions above junior college, for 0.63%; and other institutions (including kindergartens, supplementary schools, and schools for the handicapped and the gifted), for 2.02%. By the school year 1992-93, the composition has changed to: 65.18% for elementary and junior high schools; 13.03% for senior academic high and senior vocational schools; 11.50% for junior colleges and above; and 10.29% for other institutions. These changes have been an indicator that educational standards have risen to levels well beyond the fundamental education stage. In addition, only 79.98% of school-age children were receiving education in school in 1950 and the ratio reached 99.9% in the school year 1991-92 (Ministry of Education, 1992).

In 1968 the Taiwan government commenced the implementation of the tuition-free nine-year compulsory public education system, including six-year elementary and three-year junior middle schooling. A remarkable achievement of basic education is the rise

of school attendance. The percentages of students who completed elementary school entered junior high school were only 32% in 1950 and 64% in 1967. Currently, over 99.3 percent of Taiwan's sixth-graders do so, or about 98.4 percent of all children in the total population aged 12 to 14 (Ministry of Education, 1992). In 1989, the Taiwan government passed a law stipulating 12 years of compulsory education in order to meet the growing demands for skilled workers in industries, and at the same time to maintain social stability by minimizing unemployment and elevating the status of Taiwan citizens. The 12-year free education program will take effect within the next few years. Figure 1 shows the current educational system in Taiwan.

Vocational and Technical Education

In the early 1950s, the Taiwan government determined to transform the agricultural economy to an export-oriented industrial economy, and since then the rapid growth of industrial productivity has caused a greater demand for craftsmen and productive workers. To meet the need for skilled manpower, the government has formulated a consolidated policy of development and improvement in vocational and technical education (Tang, 1981).

Currently, there are roughly over 150,000 vocational school students, 100,000 technical college students, and 2,000 institute of technology students graduating each year in Taiwan. The total number of 252,000 graduates from the vocational and technical education system is far more than 60,000 academic high school graduates or 40,000 college graduates each year. The number of vocational and technical education graduates

will increase as the programs continue to expand. It is obvious that the Taiwan government has placed a heavy emphasis on vocational and technical education to provide sufficient work force for the nation's economic development.

Vocational Education

In recent years, business and industry in Taiwan have been prosperous, and the patterns of social structure have continued to change. The development of vocational education is a point of emphasis for present educational efforts. Currently, there are seven types of vocational schools in Taiwan: agricultural, industrial, commercial, marine products, nursing and midwifery, opera and arts, and home economics.

For the past four decades, the development of vocational education in Taiwan was based on the principle of equal emphasis to both quantity and quality. In the school year 1950-51, there were 77 vocational schools which included 44 junior vocational schools, 1 senior vocational school, and 32 junior/senior joint vocational schools. The 77 vocational schools accommodated 34,437 students of which 23,211 of junior vocational school students and 11,226 senior vocational school students. Of these, 35.4 percent were studying in agriculture; 25.7 percent were in industrial and vocational courses; 32 percent were pursuing commercial curricula; and 6.9 percent were in other technical fields. Subsequently, junior vocational schools were gradually reduced from year to year and was phased out after 1970. By 1991-92, the number of senior vocational schools had risen to 212. Besides, 87 senior academic high schools had vocational classes attached to them. Senior vocational school student enrollments had risen to 475,852, with 44.47 percent in

industry; 36.39 percent in commerce; 3.82 percent in agriculture, and 15.32 percent in marine products, nursing and midwifery, home economics and opera/arts (Ministry of Education, 1992). According to the long range planning for the demand and supply of manpower, the structure of vocational education in Taiwan is readjusted from time to time. The principle of readjustment is: the expansion of industrial and maritime education, and at the same time slowing the development of commercial schools and enriching the curricula of agricultural schools and readjusting home economics education according to current needs. Under the current education system, senior vocational school graduates may continue education at the university, college, institute of technology, 2- or 3-year junior college after passing the relevant entrance examination.

In the school year 1967-68, students in senior academic high schools accounted for 60 percent of the total high school student enrollment, while only 40 percent attended senior vocational high schools. The year 1971 marked a turning point when senior vocational school enrollments for the first time exceeded those for senior academic high schools. Since 1971, enrollment in vocational high schools has surpassed enrollment in academic high school and enrollment in technical colleges has also exceeded that in colleges and universities. This phenomenon has marked the beginning of a "new era" of vocational and technical education as proclaimed by the Taiwan government (Land, 1976). By the school year 1975-76, the ratio had been completely reversed: over 60 percent of senior high school students attended senior vocational high schools. This trend continued and in the school year 1991-92, 68.8 percent of senior high school students attended

senior vocational high schools, while only 31.2 percent attended senior academic high schools. This pattern stands as an exceptional development rarely found in other countries. The reverse of the ratio between vocational and academic high school enrollments allowed Taiwan to meet the growing demand for skilled workers needed by the economic development during this period.

Technical Education

Taiwan's emphasis upon mass vocational education extends to post-secondary level as well, as evidenced by the creation of closer linkages between high schools and post-secondary institutions (Lucas, 1981). In 1950, there were only 3 technical colleges with a total enrollment of 1,286 students. Since then, the Taiwan government has devoted much effort to the establishment of additional technical colleges and permitted the private sector to engage in such establishment. As the economy continued to grow, more technical colleges were added to meet the growing need for highly trained technical workforce for business and industry as well as to support the manpower need for the Ten Major Construction Projects. By 1991, there were 73 technical colleges in which 60 of them were private owned. The total enrollment was 332,127 and 85 percent of them were from the private colleges (Ministry of Education, 1992).

There are three types of technical colleges offered in Taiwan, namely: five-year college, three-year college, and two-year college. The five-year colleges admit junior high school graduates and require five years of education in school. The three-year colleges admit senior vocational school graduates and require three years of education. However,

Ministry of Education decided to phase out the three-year programs by 1994 due to its overlapping curriculum with the regular four-year baccalaureate programs. The two-year colleges are two year programs and admit graduates of senior vocational schools as well as senior academic high schools. At present, nearly 70 percent of the technical colleges offer five-year and two-year programs.

In addition to the expansion of technical colleges, the first institute of technology was established in 1974. Currently, there are three institutes of technology which offer two-year and four-year undergraduate training in engineering and technology, as well as graduate programs leading to master's and doctoral degrees. The three institutes of technology admit junior college graduates to pursue two years of regular education and admit senior vocational school graduates to take four years of college education. In 1991, there were 5,724 students in undergraduate programs and 1,012 students in graduate programs. To upgrade Taiwan's technological base and shift its low-cost, labor intensive industries to an array of high-technology industries, the government has planed to expand the program offerings in technology institutes.

Vocational Training

Vocational training plays an important role in cultivating a country's skilled labor. It can improve the quality of the skilled labor, and adjust manpower supply and demand effectively so as to meet the needs of rapid economic development. In view of this, the Taiwan government established a manpower planning committee in 1967 under the Council for Economic Planning and Development to promote vocational training. A year

later, the first national vocational training was founded with United Nations sponsorship to meet nation's economic growth and provide sufficient technical manpower (Land, 1990). In 1981, the Employment and Vocational Training Administration (EVTA) was established under the Ministry of the Interior to coordinate, promote, and supervise vocational training and development, employment services and trade skill tests. In 1987 the EVTA became a subordinate of the Council of Labor Affairs, Executive Yuan.

Today, under the encouragement and the support of the government, both the public training and in-plant training have been well-developed. There are 13 public vocational training centers with state-of-the-arts facilities and equipments as well as updated curriculum in the island. Tuition, books, and practice materials are free, and in some instances, the disadvantages receive free room and board. Job placement records shows a high degree of success, and many youngsters aspire to enter the training programs (Land, 1990). In fact, the vocational training has played a major role in supplying the skilled workers of the job market and help solve the youth unemployment problems (Kung, 1986).

Conclusions

The continuous economic prosperity in Taiwan draws worldwide attention. Many economists and researchers are investigating the elements for Taiwan's economic success, because the economic development in Taiwan can carry important implications for other less developed nations as they struggle toward modernization. However, most agree that human resources play a key role in the economic development process. It appears that

the Taiwan's economic success lends further support of the idea that human resources development has an important bearing on economic growth. Taiwan has a skilled and productive work force to keep her competitive in the world market. As vocational and technical education grew, so did Taiwan's industries. This did not happen by chance, but by careful design. To become economically stable and influential in the world marketplace, it requires large pools of trained manpower to support the growing industry. Welch (1983) and Lucas (1981) concluded that without the efficient and highly skilled work force, Taiwan would not have held their economic advantage. Many researchers draw similar conclusions (e.g., Chen & Shih, 1989; Land, 1990).

Though, there was no study showed what role vocational education and training did actually play in Taiwan's economic success. Taiwan's policy analysts have avoided any simplistic "cost-benefit" model in attempting to assess the return on the country's investment in vocational and technical education. Nonetheless, national policy makers and educators appear convinced that vocational education and training has had a major influence in providing the skilled labor force that transformed Taiwan into one of the region's most powerful economies. In addition, expert opinions incline to the belief that such educational effort provides the pervasive infrastructure undergirding national economic growth (e.g., Hagen, 1968; Harbison & Myers, 1964; Lucas, 1981). Furthermore, Taiwan's policy on education has been proactive, progressive and constantly changing to meet its national objectives. The overall educational programs, particularly in vocational and technical education, have been carefully planned and developed over the

past thirty years to meet the demand and challenge. To the extent, it appears that one of the major factors contributing to the successful economic development in Taiwan is the quality and quantity of the well-educated and highly skilled work force provided by vocational and technical education.

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Table 1

Economic Growth in Taiwan from 1952 to 1992

Area	Unit	1952	1973	1982	1992
GNP	Mill US$	1,327	10,226	48,550	210,886
Growth rate	Percent	8.30	11.92	4.05	6.06
Per capita income	US$	132	515	2,653	10,215
Exports	Mill US$	116	4,483	22,204	81,470
Imports	Mill US$	187	2,793	18,888	71,977

Table 2

International Comparisons of the Economic Conditions

Item	Unit	Year	Taiwan	Korea	Japan	U.K.	Netherlands	U.S.A.
Population	Millions	1990	20.2	42.9	123.5	57.4	15.0	250.0
Labor force participation rate	Percent	1990	59.2	60.0	62.6	64.2	66.7	66.4
Unemployment rate	Percent	1990	1.7	2.4	2.1	5.9	5.0	5.4
Per Capita GNP	US$	1991	8,788	6,498	26,889	17,745	17,320	22,537
Economic growth rate	Percent	1991	7.2	8.4	4.5	-2.2	4.5	-.07
Imports	Percent	1991	14.9	18.6	0.8	6.6	-0.2	-1.5
Exports	Percent	1991	13.3	10.6	9.6	-0.4	1.4	7.2
Ave annual rate of inflation	Percent	1981-1991	1.9	5.2	1.9	6.0	2.2	4.1

Presented by Steve C. Yuen
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Table 3

Public and Private Schools by Institutional Types and Student Enrollments, 1991-92

School Type	Number of School			Number of Student		
	Public	Private	Total	Public	Private	Total
Institute of Higher Education						
Colleges and Universities	28	22	50	104,532	148,930	253,462
Junior Colleges	13	60	73	51,455	280,672	332,127
Secondary Schools						
Junior High Schools	697	9	706	1,109,538	66,864	1,176,402
Senior Academic High Schools	80	97	177	158,018	60,043	218,061
Senior vocational High Schools	95	117	212	182,331	293,521	475,852
Elementary Schools	2,473	22	2,495	2,267,458	25,986	2,293,444
Kindergartens	716	1,779	2,495	48,271	186,828	235,099
Supplementary Schools						
Elementary & Junior High Levels	334	3	337	43,326	1,548	44,874
Senior Academic High	7	35	42	3,351	4,654	8,005
Senior Vocational High	73	107	180	69,215	132,785	202,000
Junior Colleges & Open Universities	9	0	9	53,982	0	53,982
Special Schools	9	2	11	3,345	275	23,620

Figure 1

The Current Education System in Taiwan